Name:

at1124exam: Radicals and Squares (v918)

Question 1

Simplify the radical expressions.

$\sqrt{63}$ $\qquad$ $\sqrt{98}$ $\qquad$ $\sqrt{45}$

$\sqrt{3 \cdot 3 \cdot 7}$ $\qquad$ $\sqrt{7 \cdot 7 \cdot 2}$ $\qquad$ $\sqrt{3 \cdot 3 \cdot 5}$

$3\sqrt{7}$ $\qquad$ $7\sqrt{2}$ $\qquad$ $3\sqrt{5}$

Question 2

Find all solutions to the equation below:

$$\frac{(x+6)^2}{2} + 9 \;=\; 17$$

First, subtract 9 from both sides.

$$\frac{(x+6)^2}{2} = 8$$

Then, multiply both sides by 2.

$$(x+6)^2 = 16$$

Undo the squaring. Remember the plus-minus symbol.

$$x + 6 = \pm 4$$

Subtract 6 from both sides.

$$x = -6 \pm 4$$

So the two solutions are $x = -2$ and $x = -10$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 - 14x = -40$$

$$x^2 - 14x + 49 = -40 + 49$$
$$x^2 - 14x + 49 = 9$$
$$(x-7)^2 = 9$$
$$x - 7 = \pm 3$$
$$x = 7 \pm 3$$
$$x = 10 \quad \text{or} \quad x = 4$$

Question 4

Any quadratic function, with vertex at (h, k), can be expressed in vertex form:

$$y = a(x-h)^2 + k$$

A quadratic function is shown below in standard form.

$$y = 2x^2 + 24x + 77$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 2 .

$$y = 2(x^2 + 12x) + 77$$

We want a perfect square. Halve 12 and square the result to get 36 . Add and subtract that value inside the parentheses.

$$y = 2(x^2 + 12x + 36 - 36) + 77$$

Factor the perfect-square trinomial.

$$y = 2((x+6)^2 - 36) + 77$$

Distribute the 2.

$$y = 2(x+6)^2 - 72 + 77$$

Combine the constants to get **vertex form**:

$$y = 2(x+6)^2 + 5$$

The vertex is at point $(-6, 5)$.